IN THE CLAIMS

Please amend the claims as shown in the following listing of claims, which replaces all prior versions and listings of claims in the present application:

1. (Currently amended) A method of processing a substrate, the method comprising:

providing a substrate in a process chamber having a wall that defines a chamber top surface, the substrate having a surface;

introducing a gas into the process chamber;

energizing the gas by applying an RF current through a multi-turn antenna above ~~an external~~ the chamber top surface of ~~a~~ the wall of the process chamber to pass RF energy through the wall ~~of the process chamber~~ to the gas inside the process chamber to energize the gas;

directing radiation onto the substrate surface ~~from directly above the substrate and~~ through the chamber top surface and wall of the process chamber;

detecting radiation reflected from the substrate from directly above the surface of the substrate after the radiation propagates through the chamber top surface and wall;

collimating the detected radiation; and

evaluating the detected collimated radiation to monitor the depth of a layer being processed on the substrate.

2. (Previously Presented) A method according to claim 1 comprising energizing the gas by powering a multi-turn antenna comprising a coil that spirals radially inward.

3. (Currently amended) A method according to claim 2 wherein the multi-turn antenna (1) covers a portion of ~~a ceiling of the process chamber~~ the chamber top surface, (2) is non-vertical, or (3) comprises a coil.

4. (Currently amended) A method according to claim 2 wherein the multi-turn antenna covers a portion of ~~a ceiling of the process chamber~~ the chamber top surface, and wherein the ~~ceiling~~ chamber top surface (1) is at least partially dome shaped, (2) comprises a ceramic, or (3) comprises a portion that is permeable to RF energy.

5. (Currently amended) A method according to claim 1 wherein the radiation propagating through the chamber top surface and wall comprises an optical beam.

6. (Previously presented) A method according to claim 1 wherein the wall comprises a window that (1) faces the substrate, (2) is permeable to X-rays, (3) is permeable to an optical beam, (4) comprises one or more of silica, sapphire or quartz, (5) is removable from the wall, or (6) is permanently affixed about an opening in the wall.

7. (Original) A method according to claim 1 comprising monitoring radiation propagating through the wall with a process monitoring assembly, and wherein the process monitoring assembly (1) is housed in an enclosure above the wall, (2) is adapted to be mounted above a window in the wall, (3) is mounted to allow line-of-sight view of the substrate in the process chamber, (4) is responsive to radiation, or (5) comprises an interferometer.

8. (Original) A method according to claim 1 comprising monitoring radiation propagating through the wall with a process monitoring assembly comprising a signal source, a signal detector, a collimating assembly and a radiation transmission cable connecting the collimating assembly to the signal source and signal detector, the radiation transmission cable having a bifurcated end.

9. (Original) A method according to claim 8 comprising connecting a first branch of the bifurcated end to the signal source and a second branch of the bifurcated end to the signal detector.

10. (Currently amended) A method of processing a substrate, the method comprising:

placing a substrate in a process chamber having a wall that defines a chamber top surface, the substrate having a surface;

introducing a gas into the process chamber;

applying an RF current through a multi-turn antenna above ~~an external surface of~~ a portion of the chamber top surface of the wall ~~a ceiling~~ of the process chamber facing the substrate to inductively couple RF energy through the ~~portion of the ceiling of the process~~ chamber top surface and the wall to the gas inside the process chamber to energize the gas;

directing radiation onto the substrate surface from directly above the surface of the substrate and through the ~~external surface of the portion of the ceiling~~ chamber top surface of the wall of the process chamber;

detecting radiation reflected from the substrate from directly above the surface of the substrate after the radiation propagates through a window in the portion of the ~~ceiling~~ chamber top surface facing the substrate;

collimating the detected radiation; and

evaluating the detected collimated radiation to monitor the depth of a layer being processed on the substrate.

11. (Cancelled)

12. (Previously Presented) A method according to claim 10 comprising inductively coupling the RF energy by powering a multi-turn antenna that (1) is non-vertical or (2) comprises a coil.

13. (Currently amended) A method according to claim 10 wherein the portion of the ~~ceiling~~ chamber top surface substantially facing the substrate (1) is at least partially dome shaped, (2) comprises a ceramic, or (3) comprises a portion that is permeable to RF energy.

14. (Previously Presented) A method according to claim 10 comprising monitoring radiation comprising an optical beam propagating through the window.

15. (Previously Presented) A method according to claim 10 wherein the window (1) faces the substrate, (2) is permeable to X-rays, (3) is permeable to an optical beam, (4) comprises one or more of silica, sapphire or quartz, (5) is removable from the wall, or (6) is permanently affixed about an opening in the wall.

16. (currently amended) A method according to claim 10 comprising detecting radiation with a process monitoring assembly, wherein the process monitoring assembly (1) is housed in an enclosure above the portion of the ~~ceiling~~ chamber top surface facing the substrate, (2) is adapted to be mounted above the window, (3) is mounted to allow line-of-sight view of the substrate in the process chamber, (4) is responsive to radiation, or (5) comprises an interferometer.

17. (Currently amended) A method of processing a substrate, the method comprising:

providing a chamber having a wall, the wall comprising ~~an external~~ a chamber top surface that is at least partially dome shaped;

providing a substrate in the chamber, the substrate having a surface;

introducing a gas into the chamber;

inductively coupling RF energy to the gas in the chamber by passing the RF energy from above the at least partially domed ~~external~~ chamber top surface to the gas inside the chamber;

directing radiation onto the substrate surface from above the at least partially domed ~~external~~ chamber top surface of the chamber;

monitoring radiation reflected from the substrate from directly above a surface of the substrate after the radiation propagates through the at least partially domed ~~external~~ chamber top surface during processing of the substrate;

collimating the detected radiation; and

evaluating the monitored collimated radiation to monitor the depth of a layer being processed on the substrate.

18. (Previously Presented) A method according to claim 17 comprising monitoring radiation that propagates through a window in the wall.

19. (Previously Presented) A method according to claim 17 comprising powering an antenna covering a portion of the wall of the chamber to couple energy to process gas in the chamber.

20. (Previously Presented) A method according to claim 17 comprising monitoring radiation comprising an optical beam propagating through the window.

21. (Currently amended) A method of processing a substrate, the method comprising:

placing a substrate in a first enclosure having a chamber top surface, the substrate having a surface;

introducing a process gas into the first enclosure;

applying an RF current through a multi-turn antenna to pass RF energy from outside ~~an external surface of a portion of~~ the ~~ceiling~~ chamber top surface of the first enclosure facing the substrate to the process gas inside the first enclosure to energize the process gas;

directing radiation onto the substrate surface from directly above the surface of the substrate and through the ~~external surface of the portion of the ceiling~~ chamber top surface of the process chamber;

collimating and monitoring radiation from directly above the surface of the substrate from after the radiation has propagated through the portion of the ~~ceiling and external surface~~ chamber top surface of the first enclosure facing the substrate and into a second enclosure disposed above the first enclosure; and

evaluating the detected collimated radiation to monitor the depth of a layer being processed on the substrate to determine a process endpoint.

22. (Previously Presented) A method according to claim 21 wherein the multi-turn antenna is within the second enclosure.

23. (Cancelled)

24. (Previously Presented) A method according to claim 21 comprising monitoring radiation with a process monitoring assembly at least partially within the second enclosure, the process monitoring system comprising a signal source, a signal detector, a collimating assembly and a radiation transmission cable connecting the collimating assembly to the signal source and signal detector, the radiation transmission cable having a bifurcated end.

25. (Original) A method according to claim 24 comprising connecting a first branch of the bifurcated end to the signal source and a second branch of the bifurcated end to the signal detector.

26-32. (Cancelled)

33. (Currently amended) A method of processing a substrate in a process chamber having a wall that defines a chamber top surface and a non-vertical multi-turn antenna ~~about~~ above the wall, the method comprising:

placing a substrate in the process chamber;

introducing a gas into the process chamber;

powering the non-vertical multi-turn antenna to couple energy through the wall to the gas inside the process chamber to energize the gas;

directing radiation onto the substrate surface from directly above the surface of the substrate and through the chamber top surface and wall of the process chamber;

detecting radiation reflected from the substrate and propagating through the wall;

collimating the directed and detected radiation; and

evaluating the detected and collimated radiation to monitor the depth of a layer being processed on the substrate.

34. (Previously Presented) A method according to claim 33 comprising powering a non-vertical multi-turn antenna comprising a coil that spirals radially inward.

35. (Previously Presented) A method according to claim 33 comprising detecting radiation propagating through a wall comprising a ceramic.

36. (Previously Presented) A method according to claim 35 wherein the ceramic comprises alumina or silica.

37. (Previously Presented) A method according to claim 33 comprising detecting radiation comprising an optical beam.

38. (Currently amended) A method of processing a substrate in a chamber having an ~~external~~ chamber top surface, and a multi-turn antenna covering at least a portion of the ~~external~~ chamber top surface, the method comprising:

providing a substrate in the chamber:

introducing a gas into the chamber;

coupling energy across the ~~substantial portion of the external~~ chamber top surface to the gas in the chamber by powering the multi-turn antenna;

directing radiation onto the substrate surface through the ~~external~~ chamber top surface of the chamber;

monitoring radiation reflected from the substrate and that propagates through the ~~portion of the external~~ chamber top surface;

collimating the monitored radiation; and

evaluating the monitored radiation to monitor the depth of a layer being processed on the substrate.

39. (Previously Presented) A method according to claim 38 comprising powering a multi-turn antenna that is (1) non-vertical or (2) a coil.

40. (Previously Presented) A method according to claim 38 comprising detecting radiation comprising an optical beam.

41. (Currently amended) A method of processing a substrate in a chamber comprising a flat wall that defines a chamber top surface facing the substrate and a multi-turn antenna at least partially covering the flat wall, the method comprising:

providing a substrate in the chamber:

introducing a gas into the chamber;

coupling energy across the chamber top surface and flat wall to the gas in the chamber by powering the multi-turn antenna;

directing radiation across the flat wall of the chamber;

detecting radiation that propagates through the chamber top surface and flat wall;

collimating the detected radiation; and

evaluating the detected collimated radiation to monitor the depth of a layer being processed on the substrate.

42. (Previously Presented) A method according to claim 41 comprising powering a multi-turn antenna that is a coil.

43. (Previously Presented) A method according to claim 41 comprising detecting radiation comprising an optical beam.

44. (Currently amended) A method of processing a substrate in a chamber comprising a wall that defines a chamber top surface facing the substrate, the wall being at least partially covered by a multi-turn antenna, a cathode within the chamber, and an RF power source, the method comprising:

providing a substrate in the chamber:

introducing a gas into the chamber;

applying an RF signal to the cathode and multi-turn antenna by powering the RF power source to form a plasma in the chamber;

directing radiation onto the substrate surface through the chamber top surface and wall of the chamber;

detecting radiation reflected from the substrate and that propagates through the chamber top surface and wall;

collimating the monitored radiation; and

evaluating the detected collimated radiation to monitor the depth of a layer being processed on the substrate.

45. (Previously Presented) A method according to claim 44 comprising detecting radiation comprising an optical beam.

46-55. (Cancelled)

56. (Previously Presented) A method according to claim 1 comprising applying an RF current through a multi-turn antenna comprising a coil having separate turns, each turn having a different radius.

57. (Previously Presented) A method according to claim 1 wherein the process chamber is an etching chamber.

58. (Currently amended) A method according to claim 7 wherein the process monitoring assembly is abutting the ~~external~~ chamber top surface of the wall of the process chamber.

59. (Previously Presented) A method according to claim 10 comprising applying an RF current through a multi-turn antenna comprising a coil that spirals radially inward.

60. (Previously Presented) A method according to claim 10 comprising applying an RF current through a multi-turn antenna comprising a coil having separate turns, each turn having a different radius.

61. (Previously Presented) A method according to claim 10 wherein the process chamber is an etching chamber.

62. (Currently amended) A method according to claim 16 wherein the process monitoring assembly is abutting the ~~external~~ chamber top surface of the ~~portion of the ceiling of~~ the process chamber.

63. (Previously Presented) A method according to claim 17 comprising powering an multi-turn antenna comprising a coil that spirals radially inward.

64. (Previously Presented) A method according to claim 17 comprising applying an RF current through a multi-turn antenna comprising a coil having separate turns, each turn having a different radius.

65. (Previously Presented) A method according to claim 17 wherein the chamber is an etching chamber.

66. (Currently amended) A method according to claim 17 comprising monitoring radiation with a process monitoring assembly that is abutting the ~~external~~ chamber top surface of the wall that is at least partially dome shaped.

67. (Previously Presented) A method according to claim 21 comprising applying an RF current through a multi-turn antenna comprising a coil that spirals radially inward.

68. (Previously Presented) A method according to claim 21 comprising applying an RF current through a multi-turn antenna comprising a coil having separate turns, each turn having a different radius.

69. (Previously Presented) A method according to claim 21 wherein the first enclosure is an etching chamber.

70. (Currently amended) A method according to claim 21 comprising monitoring radiation with a process monitoring assembly that is abutting the ~~external~~ chamber top surface of the ~~portion of the ceiling of the~~ first enclosure.

71. (Previously Presented) A method according to claim 33 comprising powering a non-vertical multi-turn antenna comprising a coil that spirals radially inward.

72. (Previously Presented) A method according to claim 33 comprising powering a non-vertical multi-turn antenna comprising a coil having separate turns, each turn having a different radius.

73. (Previously Presented) A method according to claim 33 wherein the process chamber is an etching chamber.

74. (Currently amended) A method according to claim 33 comprising detecting radiation with a process monitoring assembly that is abutting the ~~external~~ chamber top surface of the ~~portion of the~~ wall of the process chamber.

75. (Previously Presented) A method according to claim 38 comprising powering a multi-turn antenna comprising a coil that spirals radially inward.

76. (Previously Presented) A method according to claim 38 comprising powering a multi-turn antenna comprises a coil having separate turns, each turn having a different radius.

77. (Previously Presented) A method according to claim 38 wherein the chamber is an etching chamber.

78. (Currently amended) A method according to claim 38 comprising monitoring radiation with a process monitoring assembly that is abutting the ~~external~~ chamber top surface ~~of chamber~~.

79. (Previously Presented) A method according to claim 41 comprising powering a multi-turn antenna comprising a coil that spirals radially inward.

80. (Previously Presented) A method according to claim 41 comprising powering a multi-turn antenna comprises a coil having separate turns, each turn having a different radius.

81. (Previously Presented) A method according to claim 41 wherein the chamber is an etching chamber.

82. (Previously Presented) A method according to claim 41 comprising detecting radiation with a process monitoring assembly that is abutting the flat wall.

83. (Previously Presented) A method according to claim 44 comprising applying an RF signal to a multi-turn antenna comprising a coil that spirals radially inward.

84. (Previously Presented) A method according to claim 44 comprising applying an RF signal to a multi-turn antenna comprises a coil having separate turns, each turn having a different radius.

85. (Previously Presented) A method according to claim 44 wherein the chamber is an etching chamber.

86. (Previously Presented) A method according to claim 44 comprising detecting radiation with a process monitoring assembly that is abutting the wall facing the substrate.

87-88. (Cancelled)

89. (Currently amended) A method of processing a substrate in a chamber comprising a wall that defines a chamber top surface facing the substrate, the wall being at least partially covered by a multi-turn antenna, a cathode within the chamber, and an RF power source, the method comprising:

providing a substrate in the chamber:

introducing a gas into the chamber;

applying an RF signal to the cathode and multi-turn antenna by powering the RF power source to form a plasma in the chamber;

directing radiation onto the substrate through the chamber top surface and wall facing the substrate;

detecting radiation reflected from the substrate and that propagates through the chamber top surface and wall using a monitoring assembly abutting ~~an external~~ the chamber top surface of the wall of the chamber;

collimating the detected radiation; and

evaluating the detected collimated radiation to monitor the depth of a layer being processed on the substrate.